

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
Bldg. 202 Rm. 211
Gaithersburg, Maryland 20899

SRM Number: 3102a
MSDS Number: 3102a
SRM Name: Antimony Standard Solution
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Antimony Standard Solution

Description: SRM 3102a is a single element solution prepared gravimetrically to contain a nominal 10 mg/gL of antimony with an approximate nitric acid and hydrofluoric acid combined volume fraction of 10 % and 2 % respectively.

Other Designations: **Antimony** (antimony regulus; stibium; antimony black) in **Nitric Acid** (aqua fortis; hydrogen nitrate; azotic acid; engravers acid)/**Hydrofluoric Acid** (hydrogen fluoride; fluorhydric acid); **Antimony** in **Standard Solution**

Name	Chemical Formulas	CAS Registration Numbers
Nitric Acid	HNO ₃	7697-37-2
Hydrofluoric Acid	HF	7664-39-3
Antimony	Sb	7440-36-0

DOT Classification: Corrosive Liquid, Toxic N.O.S. (Nitric Acid and Hydrofluoric Acid) UN2922

Manufacturer/Supplier: It is available from a number of suppliers.

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration (%)	Exposure Limits and Toxicity Data
Nitric Acid	10	ACGIH TLV-TWA: 2 mg/kg or 5 mg/m ³
		OSHA TLV-TWA: 2 mg/kg or 5 mg/m ³
		Human, Oral: LD ₅₀ : 430 mg/kg
Hydrofluoric Acid	2	ACGIH TLV-TWA: 3 mg/kg or 2.5 mg/m ³
		OSHA TLV-TWA: 3 mg/kg or 2.5 mg/m ³
		Human, Inhalation: 50 mg/kg/30 min
		Man, Inhalation: TC ₅₀ : 100 mg/m ³ /5 min
		Man, Oral: TD ₅₀ : 143 mg/kg
Antimony	1	ACGIH TLV-TWA: 0.5 mg/m ³
		OSHA TLV-TWA: 0.5 mg/m ³

SECTION III. PHYSICAL/CHEMICAL CHARACTERISTICS

Nitric Acid	Hydrofluoric Acid	Antimony
Appearance and Odor: A colorless to slightly yellow liquid that darkens to a brownish color upon aging and exposure to light; irritating, pungent odor.	Appearance and Odor: A colorless, fuming liquid with a strong, irritating, pungent odor.	Appearance and Odor: A lustrous white solid.
Relative Molecular Mass: 63.02	Relative Molecular Mass: 20.01	Relative Atomic Mass: 121.75
Density: 1.0543 (10 % nitric acid)	Density: 0.987 to 0.991	Density: 6.684
Solubility in Water: Soluble	Solubility in Water: Soluble	Solubility in Water: Insoluble
Solvent Solubility: Decomposes in alcohol.	Solvent Solubility: Soluble in alcohol, benzene, toluene, <i>m</i> -xylene, and tetralin.	Solvent Solubility: Soluble in ammonium sulfide solutions and hot sulfuric acid.

NOTE: The physical and chemical data provided are for the pure components. Physical and chemical data for this antimony/hydrofluoric acid/nitric acid solution do not exist. The actual behavior of the solution may differ from the individual components. This solution is clear.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: N/A Method Used: N/A Autoignition Temperature: N/A

Flammability Limits in Air (Volume %):	UPPER:	N/A
	LOWER:	N/A

Unusual Fire and Explosion Hazards: Although nitric acid does not burn, it is a powerful oxidizing agent that can react with combustible materials to cause fires. Hydrofluoric acid is a negligible fire hazard when exposed to heat and/or flames. Hydrofluoric acid may ignite or explode on contact with combustible materials.

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire. Use a water spray to dilute nitric acid and hydrofluoric acid and to absorb liberated oxides of nitrogen.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full face piece in the pressure demand or positive mode and other protective clothing.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** **Unstable**

Conditions to Avoid: Avoid contact with combustible and other incompatible materials.

Incompatibility (Materials to Avoid): Avoid contact with acids, bases, amines, halogens, halo carbons, cyanides, metals, metal oxides, metal salts, metal carbides, peroxides, oxidizing materials, and reducing agents.

See Section IV: *Unusual Fire and Explosion Hazards*.

Hazardous Decomposition or Byproducts: Hazardous decomposition of nitric acid can produce various nitrogen oxides, including nitric oxide (NO), nitrogen dioxide (NO₂), nitrous oxide (N₂O), as well as nitric acid mist or vapor. Thermal decomposition of hydrofluoric acid may release halogenated (fluorinated) compounds. Thermal decomposition of antimony may release toxic and/or hazardous gases.

Hazardous Polymerization: _____ Will Occur X Will Not Occur

SECTION VI. HEALTH HAZARD DATA

Route of Entry: X Inhalation X Skin X Ingestion

Health Hazards (Acute and Chronic): Nitric Acid: Nitric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting.

Hydrofluoric Acid: Hydrofluoric acid may be fatal if inhaled, swallowed, or absorbed through the skin. This material causes burns and is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. Inhalation may be fatal as a result of spasm, inflammation, and edema of the larynx and bronchi, chemical pneumonitis, and pulmonary edema. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea, and vomiting. Repeated exposure to low concentrations may cause nasal congestion, nosebleeds, sinus problems, and bronchitis.

Direct eye contact with hydrofluoric acid may range from mild irritation to corneal burns. If the solution is not promptly removed, permanent visual defects and blindness may result. Hydrofluoric acid burns are characterized by blanched appearance of the skin with excruciating pain. Both the liquid and the vapor can cause severe burns that may not be immediately painful or visible. Solutions less than 2 % may cause burns. The full extent of tissue damage may not exhibit itself for 12h to 14h after exposure. Hydrogen fluoride will penetrate the skin and attack the underlying tissues and bone. Profound hypocalcemia can occur sometimes with fatal results. Chronic effects can include changes in bones and joints in humans.

Antimony: Antimony may be harmful by inhalation, ingestion, or skin absorption. Exposure may cause irritation of the skin and eyes. Inhalation may cause irritation of the respiratory tract and gastrointestinal tract, tightness and pain in the chest, difficulty breathing, and dizziness. Ingestion may result in nausea, vomiting, and diarrhea. Long term exposure to antimony may result in laryngitis, headaches, and degenerative changes of the liver and kidneys. Antimony crosses the placenta, is present in amniotic fluid, and is excreted in human milk.

Medical Conditions Generally Aggravated by Exposure: Nitric acid may effect eye disorders, respiratory disorders, and allergies. Hydrofluoric acid may effect bone, joint, or tooth disorders, kidney disorders, and respiratory disorders.

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES :

Skin Contact: Remove contaminated shoes and clothing. Rinse affected area with large amounts of water followed by washing the area with soap and water. Watch for chemical irritations and treat them accordingly. Contact medical assistance.

Eye Contact: Immediately flush eyes, including under the eyelids, with copious amounts of water for at least 15 min. Obtain medical assistance.

Inhalation: If inhaled, move the victim to fresh air. If breathing is difficult, give oxygen; if the victim is not breathing, give artificial respiration. Obtain medical assistance.

Ingestion: If ingestion occurs, wash out mouth with water. **DO NOT** induce vomiting. Contact medical assistance immediately.

TARGET ORGAN(S) OF ATTACK: **Nitric Acid:** skin, teeth, eyes, and upper respiratory tract
 Hydrofluoric Acid: skin and skeletal system
 Antimony: liver and kidneys

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Notify safety personnel of spills. Surfaces contaminated with spills should be covered with soda ash or sodium bicarbonate to neutralize the acid. Place the neutralized material into containers suitable for eventual disposal, reclamation or destruction.

Waste Disposal: Follow all federal, state, and local laws governing disposal.

Handling and Storage: Provide general and local explosion proof ventilation systems to maintain airborne concentrations below the TLV. Provide approved respiratory apparatus for nonroutine or emergency use. Wear gloves and chemical safety glasses where contact with the liquid or high vapor concentrations may occur. An eye wash station and washing facilities should be readily available near handling and use areas. Wash exposed skin areas several times a day with soap and warm water.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Store this material in its original bottle at room temperature.

SECTION VIII. SOURCE DATA/OTHER COMMENTS

Sources: MDL Information Systems, Inc., MSDS *Nitric Acid*, March 16, 1999.
MDL Information Systems, Inc., MSDS *Hydrogen Fluoride*, March 16, 1999.
MDL Information Systems, Inc., MSDS *Antimony*, June 2, 1999.
The Merck Index, 11th Ed., 1989.
The Sigma-Aldrich Library of Chemical Safety Data, Ed. II., 1988.

Disclaimer: Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified values for this material are given on the NIST Certificate of Analysis.